

BUREAU OF WATER

South Carolina Department of Health and Environmental Control

SHELLFISH MANAGEMENT AREA 10B

2003 ANNUAL UPDATE

Shellfish Sanitation Program

Water Monitoring, Assessment and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

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2003 ANNUAL UPDATE

[Data Thru December 2002]

Shellfish Management Area 10B Shellfish Sanitation Program



Preparers: Benjamin S. Whaley, Environmental Health Manager
Harry M. Seel, Jr., District Program Manager
Trident Environmental Quality Control District
1362 McMillan Avenue, Suite 300
Charleston, South Carolina 29405

Reviewers/Editors:
David G. Baize, Division Director
(and) Charles Newell, Shellfish Program Manager
Water Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water
2600 Bull Street
Columbia, South Carolina 29201

David G. Baize, Division Director
Water Monitoring, Assessment, and Protection Division
Environmental Quality Control - Bureau of Water

TABLE OF CONTENTS **Shellfish Management Area 10B Annual Update**

| | |
|---|----|
| Summary | 2 |
| Introduction | 2 |
| Pollution Source Survey | 5 |
| Changes In Pollution Sources | 5 |
| Survey Procedures | 5 |
| Point Source Pollution..... | 5 |
| A. Municipal and Community Waste Treatment Facilities | 6 |
| B. Industrial Waste..... | 7 |
| C. Marinas | 7 |
| D. Radionuclides | 8 |
| Nonpoint Source Pollution..... | 8 |
| A. Urban and Suburban Stormwater Runoff..... | 8 |
| B. Agricultural Runoff..... | 8 |
| C. Individual Sewage Treatment and Disposal Systems | 8 |
| D. Wildlife and Domestic Animals..... | 9 |
| E. Boat Traffic | 9 |
| F. Hydrographic and Habitat Modification | 9 |
| G. Marine Biotoxins | 9 |
| Hydrographic and Meteorological Characteristics | 9 |
| Water Quality Studies 10 | |
| Conclusions | 11 |
| Recommendations | 11 |
| References | 12 |

Figures

| | |
|---|----|
| (1) Current Shellfish Harvesting Classification | 13 |
| (2) Potential Pollution Sources..... | 14 |

ANNUAL UPDATE
Shellfish Management Area 10B
SCDHEC EQC Bureau of Water

Data Inclusive Dates:

01 / 01 / 00 thru 12 / 31 / 02

Classification Change:

 Yes X No

Shoreline Survey Completed: YES

(I)ncreased/(D)ecreased/(N)one:

 N Approved

 N Cond. Approved

 N Restricted

 N Prohibited

Prior Report & Date: Annual -2002

SUMMARY

Area 10B will remain administratively Prohibited in its entirety. Historical and current uses of the upland areas within close proximity to Cooper River, Ashley River, and Charleston Harbor in Area 10B are not conducive to the harvest of molluscan shellfish for human consumption.

INTRODUCTION

PURPOSE AND SCOPE

The authority to regulate the harvest, sanitation, processing and handling of shellfish is granted to the South Carolina Department of Health and Environmental Control by Section 44-1-140 of the Code of Laws of South Carolina, 1976, as amended. The Department promulgated Regulation 61-47 which provides the rules used to implement this authority and outlines the requirements applied in regulating shellfish sanitation in the State. This regulation specifically addresses classification of shellfish harvesting areas and requires that all areas be examined by sanitary and bacteriological surveys and classified into an appropriate shellfish harvesting classification.

The National Shellfish Sanitation Program (NSSP) Guide For The Control Of Molluscan Shellfish is used by the United States Food and Drug Administration (USFDA) to evaluate state shellfish sanitation programs. The NSSP Model Ordinance requires that a sanitary survey be in place for each growing area prior to its use as a source of shellfish for human consumption and prior to the area's classification as Approved, Conditionally Approved, Restricted, or Conditionally Restricted. Each sanitary survey shall be updated on an annual basis and accurately reflect changes which have occurred within the area. Requirement of the annual reevaluation include, at a minimum, field observations of pollution sources, an analysis of water quality data consisting of the past years data in combination with appropriate previously collected data, review of reports and effluent samples from pollution sources, and review of performance standards for discharges impacting the growing area. A brief report documenting the findings shall also be provided.

The following criteria consistent with the NSSP Model Ordinance and S. C. Regulation 61-47 are used in establishing shellfish harvesting classifications:

Approved - Growing areas shall be classified Approved when the sanitary survey concludes that fecal material, pathogenic microorganisms, and poisonous or deleterious substances are not present in concentrations which would render shellfish unsafe for human consumption. The Approved area classification shall be designated based upon a sanitary survey which includes water samples collected from stations in the designated area adjacent to actual or potential sources of pollution. For waters sampled under adverse pollution conditions, the median fecal coliform Most Probable Number (MPN) or the geometric mean MPN shall not exceed fourteen per one hundred milliliters, and not more than ten percent of the samples shall exceed a fecal coliform MPN of forty-three per one hundred milliliters (per five tube decimal dilution). For waters sampled under a systematic random sampling plan, the geometric mean fecal coliform Most Probable Number (MPN) shall not exceed fourteen per one hundred milliliters, and the estimated ninetieth percentile shall not exceed an MPN of forty three (per five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP Guidelines.

Conditionally Approved – Growing areas may be classified Conditionally Approved when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be adopted by the Department prior to classifying an area as Conditionally Approved. Where appropriate, the management plan for each Conditionally Approved area shall include performance standards for sources of controllable pollution, e.g., wastewater treatment and collection systems, evaluation of each source of pollution, and means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate.

Restricted - Growing areas shall be classified Restricted when sanitary survey data show a limited degree of pollution or the presence of deleterious or poisonous substances to a degree which may cause the water quality to fluctuate unpredictably or at such a frequency that a Conditionally Approved classification is not feasible. Shellfish may be harvested from areas classified as Restricted only for the purposes of relaying or depuration and only by special permit issued by the Department and under Department supervision. For Restricted areas to be utilized as a source of shellstock for depuration, or as source water for depuration, the fecal coliform geometric mean MPN of restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Conditionally Restricted - Growing areas may be classified Conditionally Restricted when they are subject to temporary conditions of actual or potential pollution. When such events are predictable, as in the malfunction of wastewater treatment facilities, non-point source pollution from rainfall runoff, discharge of a major river, or potential discharges from dock or harbor facilities that may affect water quality, a management plan describing conditions under which harvesting will be allowed shall be prepared by the Department prior to classifying an area as Conditionally Restricted. Where appropriate, the management plan for each Conditionally Restricted area shall include performance standards for sources of controllable pollution (e.g., wastewater treatment and collection systems and an evaluation of each source of pollution) and description of the means of rapidly closing and subsequent reopening areas to shellfish harvesting. Memorandums of agreements shall be a part of these management plans where appropriate. Shellfish may be harvested from areas classified as Conditionally Restricted only for the purposes of relaying or depuration and only by permit issued by the Department and under Department supervision. For Conditionally Restricted areas to be utilized as a source of shellstock for depuration, the fecal coliform geometric mean MPN of Conditionally Restricted waters sampled under adverse pollution conditions shall not exceed eighty-eight per one hundred milliliters and not more than ten percent of the samples shall exceed a MPN of two hundred and sixty per one hundred milliliters for a five tube decimal dilution test. For waters sampled under a systematic random sampling plan, the fecal coliform geometric mean MPN shall not exceed eighty-eight per one hundred milliliters and the estimated ninetieth percentile shall not exceed an MPN of two hundred and sixty (five tube decimal dilution). Computation of the estimated ninetieth percentile shall be obtained using NSSP guidelines.

Prohibited - Growing areas are classified Prohibited if there is no current sanitary survey or if the sanitary survey or monitoring data show unsafe levels of fecal material, pathogenic microorganisms, or poisonous or deleterious substances in the growing area or indicate that such substances could potentially reach quantities which could render shellfish unfit or unsafe for human consumption.

BACKGROUND INFORMATION

This sanitary survey evaluates the current harvesting classification of shellfish growing waters designated as Shellfish Management Area 10B (Area 10B). Area 10B consists of approximately 25,266 acres of shellfish growing area habitat located partially in both Berkeley and Charleston Counties, South Carolina. Area 10B consists of the Charleston Harbor and all creeks emptying into the harbor, the Cooper River from the harbor heading upstream to Woods Point and the Ashley River from the harbor heading upstream to Drayton Hall.

The harvesting classifications of Area 10B prior to this sanitary survey were as follows:

Prohibited (Administrative closure)

1. The Charleston Harbor and all associated marshland;
2. The Ashley River and all associated marshland northward to Drayton Hall;
3. The Cooper River and all associated marshland northward to Woods Point.

Approved: There are no Approved waters in Area 10B.

The shellfish industry in South Carolina is based primarily on the harvest of the eastern oyster (*Crassostrea virginica*) and hard clams, which include both the northern clam (*Mercenaria mercenaria*) and several small populations of the southern clam (*Mercenaria campechiensis*). Areas in South Carolina designated for commercial harvest by the South Carolina Department of Natural Resources (SCDNR) include State shellfish grounds, culture permits, and Kings Grant areas. The ribbed mussel (*Geukensia demissa*) is also harvested in South Carolina. It is primarily gathered on a small scale by the general public for recreational harvest. The South Carolina Department of Health and Environmental Control will disallow the harvesting of shellfish within Area 10B from the waters listed below in the Recommendations.

There are no designated shellfish grounds within Area 10B. The shellfish harvesting season in South Carolina normally extends from mid-September through mid-May. SCDNR has the authority to alter the shellfish harvesting season for resource management purposes and grant permits for year-round mariculture operations. Additionally, the South Carolina Department of Health and Environmental Control has the authority to prohibit shellfish harvesting when necessary to ensure that shellfish harvested in South Carolina waters are safe for human consumption.

POLLUTION SOURCE SURVEY

CHANGES IN POLLUTION SOURCES

No substantial changes in pollution sources have occurred in Area 10B since the 2002 report.

SURVEY PROCEDURES

Shoreline surveys of Area 10B were conducted by the Trident District Shellfish Sanitation staff, by watercraft, vehicle and on foot, during the survey period and are ongoing. Extensive visual examinations of lands adjacent to the waters of Area 10B were conducted to determine potential sources of pollution entering shellfish growing waters.

POINT SOURCE POLLUTION

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities

| Permit Number | Facility Name | Facility Type |
|----------------------|-----------------------------|----------------------|
| SC0001350 | Allied Terminals/Charleston | Industrial-Discharge |
| SC0001759 | Westvaco/Charleston Mill | Industrial-Discharge |
| SC0002011 | SCE&G/Hagood Station | Industrial-Discharge |
| SC0002771 | GS Roofing Products | Industrial-Discharge |
| | | |

National Pollutant Discharge Elimination System (NPDES) Permitted Facilities

| Permit Number | Facility Name | Facility Type |
|---------------|----------------------------------|----------------------|
| SC0002852 | Amerada Hess/Virginia Ave. No. | Industrial-Discharge |
| SC0002861 | Amerada Hess/Virginia Ave. So. | Industrial-Discharge |
| SC0003026 | Equilon Lubricants/Charleston | Industrial-Discharge |
| SC0004014 | Macalloy Corporation | Industrial-Discharge |
| SC0021041 | Berkeley Co. Wtr & Sanit Author | Municipal-Discharge |
| SC0021229 | Charleston CPW/Plum Island | Municipal-Discharge |
| SC0021997 | Defense Fuel Support Pt./Charle | Industrial-Discharge |
| SC0024783 | NCSD/Felix C. Davis WWTP | Municipal-Discharge |
| SC0026069 | Charleston CPW/Pierpont Plant | Municipal-Discharge |
| SC0040771 | Mt. Pleasant/Center St. & RR Rd. | Municipal-Discharge |
| SC0041173 | Foster Wheeler Resource Recov | Industrial-Discharge |
| SC0043265 | Mt. Pleasant/Wtr TTMT Plant #1 | Municipal-Discharge |
| SC0047074 | Charleston CPW/Daniel Island | Municipal-Discharge |
| SC0047147 | Fort Sumter National Monument | Industrial-Discharge |
| SC0047261 | Exxon Mobil L&PS/Charleston | Industrial-Discharge |
| SC0047481 | Detyens Shipyards/Drydock #5 | Industrial-Discharge |
| SC0048046 | KMBT Shipyard River Terminal | Industrial-Discharge |
| SCG250040 | Evening Post Publishing Co. | Industrial-Discharge |
| SCG250189 | M-Tec Corporation | Industrial-Discharge |
| SCG670008 | Marathon Ashland/N Charleston | Industrial-Discharge |

- A. Municipal and Community Waste Treatment Facilities** - There are five municipal waste outfalls operated within Area 10B. Mount Pleasant Waterworks operates an outfall for their drinking water treatment system. This system does not contribute any fecal coliform bacteria to the surrounding waters. Each of the wastewater facilities is permitted up to the daily maximum of 400 MPN/100 ml. with a monthly daily average of 200 MPN/100 ml. These four outfalls are shown on the Potential Pollution Source Map (see Figure 2).

In May of 2002, Charleston CPW reported that a manhole at 1764 Orange Grove Shores Dr. overflowed and released 100 gallons of untreated effluent into the Ashley River. In September of 2002 the entire area was impacted by an oil spill that occurred when an Evergreen ship entered port with a cracked hull.

In February of 2001, Mount Pleasant Waterworks reported that a mainline blockage near Anna Knapp Blvd. released approximately 400 gallons of untreated effluent into Shem Creek. In May of 2001, Mount Pleasant reported a mainline blockage behind East Cooper Hospital which resulted in approximately 300 gallons of untreated effluent to enter Shem Creek. In September of 2001, Mount Pleasant reported on 9/9/01 a break in a force main near pumpstation 51 that released approximately 113,000 gallons of untreated effluent into Shem Creek. On 9/20/01 a manhole overflow near pump station 15 released 3,000 gallons of untreated effluent into the waters of Shem Creek. Also on 9/22/01 Mt. Pleasant reported a mainline blockage at Shrimp Boat Lane which resulted in 200 gallons of untreated effluent being released in to Shem Creek.

In October of 2001, North Charleston Sewer District reported that a mainline blockage caused approximately 660 gallons of effluent to enter the Ashley River. On March 20, 2001, Berkeley County Water & Sanitation Authority reported a pump failure near Station 1 which caused approximately 10,000 gallons of untreated effluent to enter Foster Creek. Also on the 20th a manhole at Stanhope and Rahway over flowed and released 15,000 gallons of untreated effluent to Foster Creek. Berkeley County reported several other manhole overflows on the 20th. A manhole at the intersection of Ryan and Janice St. released 6,000 gallons to Goose Creek, one on Tammy Drive released 3,000 gallons to Foster Creek, another at Stephanie and Jean Wells released 5,000 gallons to Foster Creek and another manhole overflowed on Inverness Dr. and released 5,000 gallons to Goose Creek. These manhole overflows were a result of excessive rain. Both Goose Creek and Foster Creek flow into the Cooper River.

- B. Industrial Waste (Discharges)** - There are approximately 17 permitted industrial wastewater discharges located within the boundary of Area 10B. Most of the outfalls are located within the Cooper River. These outfalls are shown on the Potential Pollution Source Map located in this report (see Figure 4).
- C. Marinas** - S.C. Regulation 61-47, Shellfish defines *Marina* as “any water area with a structure (docks, basin, floating docks, etc.) which is: 1) used for docking or otherwise mooring vessels; and, 2) constructed to provide temporary or permanent docking space for more than ten boats, or has more than 200 linear feet of docking space.” Area 10B supports nine marinas that provide a wide variety of boating services. There are three recreational marinas located in the Ashley River near the James Island Connector. The Ashley River also has two marinas associated with boat repair facilities. There are two marinas located in the Cooper River; the Cooper River Marina at the mouth of Shipyard Creek, and the Daniel Island Marina repair facility. Two marinas are adjacent to the harbor. The new Charleston Harbor Marina opened last year providing nearly 450 new boat slips. There is a recreational marina located in Shem Creek; however, there is limited dock space. When the boats are not in use they are stored in a

rack system. Two marinas have established sewage pumpout systems since last year, the Cooper River Marina and the City Marina. Shem Creek Marina does not have a pumpout system. Additional marina facilities include the S.C. Ports Authority cargo terminals located on the western shore of the Cooper and commercial shrimp docks located along Shem Creek that extend from the mouth of the creek to the 703 (Coleman Blvd.) Bridge. Refer to the attached Potential Pollution Sites map.

- D. Radionuclides** - Sources of radionuclides have not been identified within Area 10B, and radionuclide monitoring has not been conducted. No other sources of poisonous or deleterious substances have been identified within the area.

NONPOINT SOURCE POLLUTION

- A. Urban and Suburban Stormwater Runoff** - A shoreline survey revealed high concentrations of homes throughout area 10B. Single family homes continue to be built along the shores of the Ashley River. Daniel Island is being heavily developed residentially and commercially. Stormwater runoff can adversely impact water quality by transporting fecal coliform bacteria from land to the shellfish growing area.

There are approximately 78 stormwater permits that have been issued through 2001 within Area 10B. The majority of the permits have been issued to construction sites and/or housing subdivisions. The remaining permits are for stormwater control for schools, churches and small businesses. These areas are depicted on the attached Potential Pollution Source Map. A dredge spoil area is located on the southern most portion of Daniel Island, located at the mouth of the Wando and Cooper Rivers. Another four spoil areas are along various portions of the Cooper River. The Army Corps of Engineers conducted two dredging projects within Area 10B during calendar year 2002. The channel in Charleston Harbor was dredged, as was the channel of the Cooper River from Charleston Harbor to the Don Holt Bridge (I-526).

The uplands surrounding the shellfish growing waters of Area 10B consist of various soil textures. These have been defined by the United States Department of Agriculture (USDA), Soil Conservation Service (Berkeley Co.1980 & Charleston Co.1971) utilizing general classifications and descriptions. Although lands within Area 10B, along the Berkeley County side of the Cooper River, consist of numerous soil types, the area is generally comprised of Chipley-Echaw-Pickney soils, made up of nearly level soils on long, narrow to broad ridges in areas roughly parallel with the coastline. The USDA (1980) further describes these soils as "Moderately well drained and very poorly drained soils that are sandy throughout." The upland area along the Ashley River and the Charleston County side of the Cooper River consists of numerous soil types, the area is generally comprised of soils in the Yonges series. Soils of this series typically occur on a low, swamp-like plain and on islands of higher areas that separate and parallel major streams. The USDA (1971) further describes these soils as poorly drained to very poorly drained, level to nearly level soils that have a loamy to sandy surface layer and a loamy to clayey subsoil.

- B. Agricultural Runoff** - There are no permitted agricultural facilities located in Area 10B. The shoreline survey found nearly all of the area to contain residential, commercial and industrial properties. The Goose Creek area of the upper Cooper River is primarily marshland.
- C. Individual Sewage Treatment and Disposal Systems** - Nearly all of Area 10B lies within incorporated areas. Some septic tanks likely remain in small numbers on James Island along the harbor. The upper reaches of the Ashley and Cooper Rivers have shoreline residences that are on individual septic systems; however, they are north of the Area 10B boundary. New systems are required to be inspected by the Division of Environmental Health, Trident Health District, and approved before final installation.
- D. Wildlife and Domestic Animals** - Area 10B supports a moderate population of domestic animals attributable to the number of private residences along the shores of the Cooper River, Ashley River and the harbor. The area also supports moderate populations of wildlife; primarily various types of waterfowl, small mammals and marine mammals. The area has a limited number of small tidal creeks. This creek system provides a conduit for animal fecal coliform bacteria to be transported to the adjacent growing waters.
- E. Boat Traffic** - Recreational boat traffic is moderate throughout the area between the months of November and April and heavy between the months of May and October. Commercial small-boat traffic mainly consists of fisherman collecting blue crabs. Commercial large-boat traffic in the harbor include cargo vessels, tour boat companies, tug boats and barges, and military vessels. During the recreational shrimp baiting season, typically extending from mid-September through mid-November, recreational traffic is very heavy.
- F. Hydrographic and Habitat Modification** - Hydrographic and habitat modification in estuarine areas requires both State and Federal approval. The Charleston Harbor, portions of the Cooper River from the Charleston Harbor to just north of the I-526 Bridge require regular maintenance dredging. The U.S. Army Corps of Engineers utilizes designated tracts of land adjacent to these waters, including an area five miles offshore, as dredge spoil sites. The dredge spoil area adjacent to the old Navy base was used in the maintenance dredging of the Cooper River.
- G. Marine Biotoxins** - Bivalve shellfish contamination from marine biotoxins has not been shown to be a human health concern within Area 10B. The Department participates in a State Task Force on Toxic Algae and maintains a toxic algae emergency response team.

HYDROGRAPHIC AND METEOROLOGICAL CHARACTERISTICS

PHYSIOGRAPHY

Area 10B is comprised of the Ashley and Cooper Rivers and the Charleston Harbor. The harbor is approximately four miles wide (northwest to southeast) and three miles long (southwest to

northeast). Depths range from approximately 40 feet in the harbor's shipping channel to two feet near the shoreline. Due to minimal shoaling in the Ashley River, dredging occurs on an infrequent basis. The Cooper River, however, is dredged on a more regular basis due to moderate to heavy shoaling. This added shoaling is probably a result of added water released from Lake Marion and Moultrie. Freshwater flows into the area from both the Ashley and Cooper Rivers as well as from the Francis Marion National Forest by way of the Wando River. Overland runoff from rainfall also introduces additional freshwater into the area. High salinity ocean water enters the area from the mouth of the Charleston Harbor. The entire area is approximately 15 miles wide (northwest to southeast) and eight miles long (southwest to northeast).

Tides - Tides in Area 10B are semidiurnal, consisting of two low and two high tides occurring each lunar day. Mean tidal ranges in the Cooper River at Clouter Creek are 5.5 feet during normal tides and 7.1 feet during spring tides. Wind direction and intensity, as well as atmospheric pressure, typically cause variations in predicted tidal ranges.

Rainfall - Precipitation in Area 10B is heaviest during late summer and early autumn. Tropical storms and hurricanes occasionally produce extremely large amounts of rainfall. During winter months heavy rainfall events are uncommon, yet occasional intense thunderstorms associated with rapidly moving low pressure systems generate heavy rains. Precipitation rarely occurs in the form of snow or ice. Spring weather patterns may be dynamic with associated thunderstorms and severe weather conditions.

The yearly average for a thirty-year period for rainfall in Charleston, recorded at the Charleston Airport, is 50.74 inches. The 2002 precipitation total recorded at Plum Island on James Island was 57.0 inches. The four months, July through October, had a total of 20.45 inches of rain. This was 36% of the total rainfall recorded for the year.

Winds - Prevailing winds along the central portion of the South Carolina coast are from the south and west during spring and summer and from the north during autumn and winter. Wind speeds are generally less than 15 miles per hour (mph); however, strong weather systems may generate winds in excess of 25 mph. Tropical storms and hurricanes occur occasionally.

River Discharges - The Ashley and Cooper Rivers both discharge into Area 10B bringing freshwater from the middle of the state. The Wando River delivers freshwater from the Francis Marion National Forest to the Cooper River at their confluence.

WATER QUALITY STUDIES

MONITORING RESULTS

Area 10B, in its entirety, is administratively Prohibited for shellfish harvest due to its role as an industrial center. The numerous point source discharges and miscellaneous activities that occur throughout the area prevent the Department from screening for all **potential** deleterious substances that

could be present. It is believed that these industrial activities within Area 10B are likely to continue, therefore the area will remain Prohibited to shellfish harvesting until further notice. The Shellfish Sanitation Program no longer monitors fecal coliform bacteria concentration in Area 10B.

CONCLUSIONS

Area 10B is impacted by two sources of actual or potential pollution.

NONPOINT SOURCE RUNOFF

Nonpoint source runoff, due to urbanization, appears to be a major source of fecal coliform bacteria contamination throughout Area 10B. Development throughout the management area is continuing at a rapid pace.

POINT SOURCE DISCHARGE

There are approximately 24 permitted NPDES discharges located within the boundaries of Area 10B. Most of these discharges are located along the Cooper River.

RECOMMENDATIONS

The shoreline survey review of shellfish growing Area 10B indicate that the classification boundary descriptions are appropriate. The harvesting classification of Area 10B for this sanitary survey will be as follows:

Prohibited (Administrative closure)

1. The Charleston Harbor and all associated marshland;
2. The Ashley River and all associated marshland northward to Drayton Hall;
3. The Cooper River and all associated marshland northward to Woods Point.

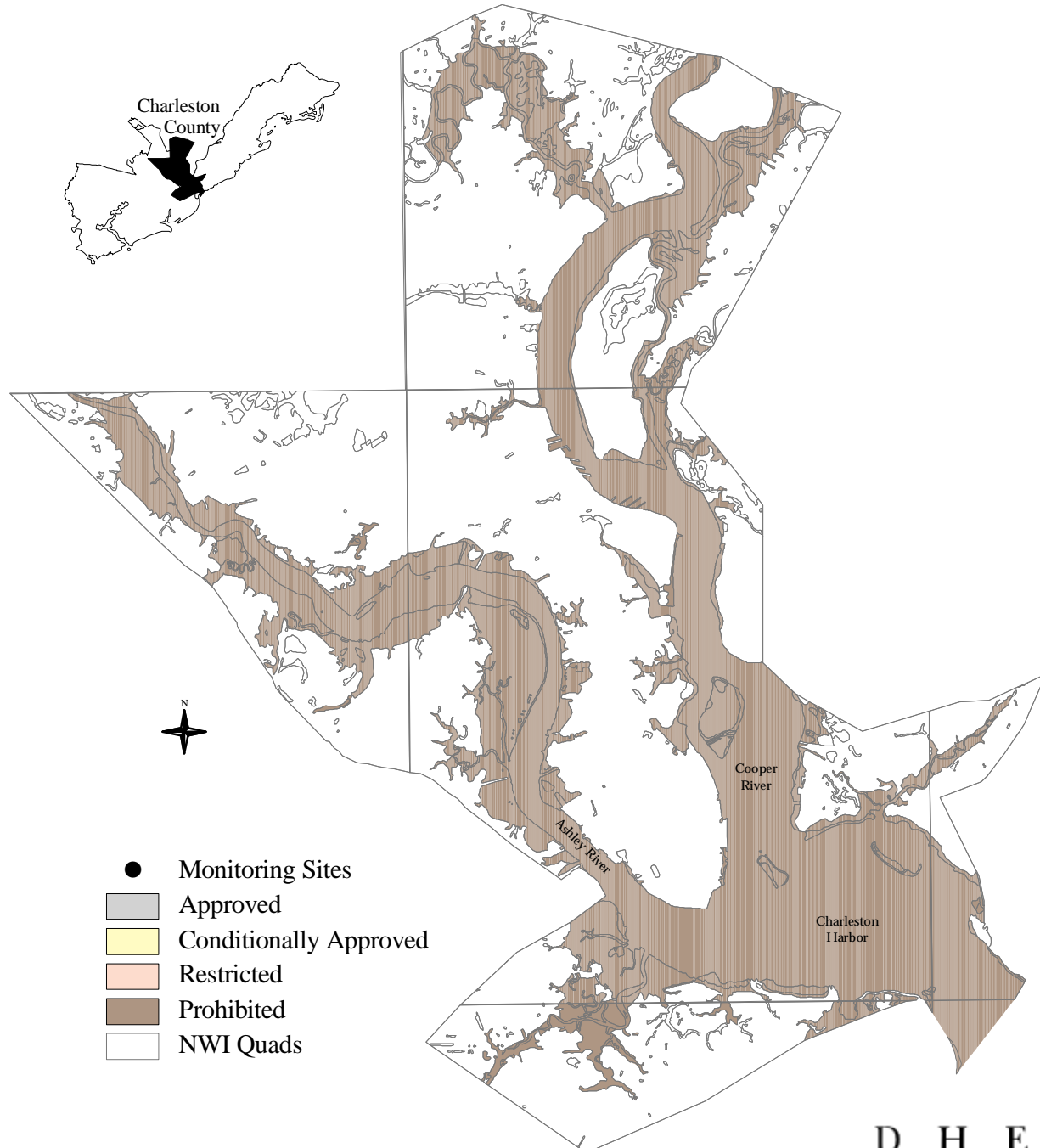
Approved: There are no Approved waters in Area 10B.

Station Addition/Deactivation/Modification: None.

REFERENCES

- National Shellfish Sanitation Program (NSSP)-- *Guide for the Control of Molluscan Shellfish*, 1997 Revision. U.S. Department of Health and Human Services, Washington, D.C.
- United States Department of Agriculture, Soil Conservation Service, 1971. *Soil survey of Charleston County, South Carolina*. In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 78.
- United States Department of Agriculture, Soil Conservation Service, 1980. *Soil survey of Berkeley County, South Carolina*. In cooperation with South Carolina Agricultural Experiment Station and South Carolina Land Resources Conservation Commission, National Cooperative Soil Survey, Washington, D.C. p. 95.

Figure 1.
Shellfish Management Area 10B
Current Classification



Legend:

- ▲ NPDES Discharge
- ⚓ Marina/Docking Facilities
- Red shaded area Storm Water Permits
- Gray shaded area Corporate Limits
- Black line County Roads
- Blue line National Wetland Inventory

Map Labels:

- Goose Creek
- Hanahan
- SC0021041
- SC0001759(4)
- SC0021997
- SC0001759
- SC0002852(2)
- SC0002852(1)
- SC0003026
- SC0002861
- SC0047481
- SC0044521
- SC0002771(1-3)
- SC0004014(2)
- SC0041173(1-4)
- SC0004014(1)
- SC0047074
- SC0004014(3-4)
- SC0048046
- SC0024783
- SC0002011
- SC0047261
- SC0001350
- SCG250040
- SC0021229
- SC0040771
- SC0043265
- SC0047147

Geographic Features:

- DUNCANS BOAT HARBOR
- DOLPHIN COVE MARINA
- COOPER RIVER MARINA
- ASHLEY MARINA
- CHARLESTON MARITIME CTR.
- CHARLESTON CITY MARINA
- RIPLEYS LIGHT MARINA
- CHARLESTON HARBOR MARINA
- SHEN CREEK MARINA
- Mount Pleasant
- Sullivan's Island
- Cooper River
- Ashley River
- North Charleston
- Charleston Harbor

